(1.)

A

REPORT

RELATIVE TO

TYNE BRIDGE.

NEWCASTLE:

Printed by T. SAINT, in Pilgrim-ſtreet.

MDCCLXXII.

BRITISH MUSEUM
30 APR 70

A

REPORT, &c.

THIS Bridge having been erected ſome Centuries ago, upon the Principles that were then in common Uſe for ſuch Edifices, as may be ſeen from many of the old Bridges over great Tide Rivers in England, and alſo in ſeveral Parts of Europe; namely, upon Stilts, ſurrounded with a Kind of Baſement, called Sterlings, has always had the ſame Inconveniences and Imperfections attending it, to which all others of this kind are ſubjected.

The Stilts are a great Number of large Piles driven down into the Bed of the River, ſupporting a Timber Platform or Framing under each Pier, a little above the loweſt Water of the River, upon which the Maſonry is eſtabliſhed; and thoſe Stilts being ſurrounded with a Row of cloſe Piling, at the Diſtance of ſeveral Feet, and the Interval filled up with Gravel and other Stone Materials thrown down at Random, and the whole connected with proper Timbers, and paved down at the Top with large Stones, a few Feet above low Water Mark, form the Footing or Baſement, for the Security of the Pier, which is called a *Sterling*.

Upon theſe Principles this Bridge has been hitherto ſupported, though the River is ſubject to rapid Floods and drift Ice in the Seaſon, without ſuffering any Thing very conſiderable, except in one or two of its Arches, within the Memory of Man.

The total Breadth of the River between the Quays or Abutments being five hundred and thirty-nine Feet, the Piers or Solids of the Bridge took up or occupied a third Part of it; and when the Tide fell below the Top of the Sterlings, they took up ſomewhat more than One-half of the free Water Way immediately above the Bridge: And this great Contraction of the Water Way has at length contributed its Effects towards bringing about its Ruin, by increaſing the Rapididity of the Stream paſſing under it, ſo much as to gull away the Ground under the Arches, ſweep away ſome of the Sterlings, undermine the Stilts, and throw down or render incapable of Repairs five of the Arches out of ten, whereof this Bridge was formerly compoſed. The Arches of the Bridge itſelf are likewiſe too low; ſeven out of the ten Arches being totally filled

up

BRITISH MUSEUM 30 APR 70

up with Water above their Crowns or Keyſtones, by the late Flood of the 17th of November laſt; which Flood produced this, and many unhappy Events of the Kind upon this and the neighbouring Rivers.

This Flood was three Feet ſix Inches higher at this Bridge, than the Memory of Man or Tradition has ever taken Notice of, and the Ground, or Bed of the River, a little below the Points of the Sterlings, on the Eaſt or lower ſide of the Bridge, is gull'd away ſo as to produce a Depth of twenty-ſeven Feet ſix Inches of Water at low Water; when, at a Medium, there is only between ſeven and eight Feet Depth of Water in the River, immediately above the Bridge, or on the Weſt or upper Side of it: And this Circumſtance is now mentioned to ſhew the Danger the four remaining Arches ſtill continue expoſed to, by ſtanding as it were upon the *Edge of a Precipice.*

The Inconvenience juſt now mentioned, ariſing from contracting the Water Way, by this Manner of Conſtruction, and which has at length been fatal to the Edifice itſelf, is far from being the only One, which this Way of proceeding occaſions. The Trade now carried on upon this River, ſo neceſſary to the Kingdom in general, requires

quires many Hundreds of Keels with Coals, and other ſmall Veſſels, to paſs and repaſs under this Bridge, almoſt every Tide, be it in the Day-time, or in the Night. The Sterlings which project from ſix to eight Feet from the Piers, under each of the Arches, when covered a little by the Tide, expoſe them unavoidably to frequent Damages and Loſſes, and often to utter Ruin and Deſtruction. And of ſuch Events, Gentlemen converſant in the Trade, are ſufficiently acquainted with numberleſs Inſtances, ſo as to make it totally unneceſſary to mention any Thing further, than that the Sterlings themſelves frequently ſuffer in the Rencounter, and, by inceſſant Blows, contribute to their wanting frequent and expenſive Repairs.

Other Inconveniences attending this Bridge muſt now be mentioned, which are ſufficiently known to every Perſon that has had occaſion to paſs over it; one of which is, the ſteep Aſcent from the South End of the Bridge, riſing one Foot in Seven or Eight for a conſiderable Space, with the confined narrow Street all the Way, which renders the whole extremely dangerous to every Paſſenger, whether in a Carriage, on Horſeback, or on Foot; and frequently occaſions great

Interruptions and Confuſion, when Carriages or a number of Paſſengers happen to meet upon it; and being the principal Road of Communication between Scotland and the Southern Parts of the Kingdom, expoſes every Individual to thoſe Hazards, that has occaſion to make Uſe thereof. The other Inconvenience is the Narrowneſs of the Bridge itſelf, which within the Parapets is fifteen Feet wide only; and in ſeveral Places reduced to nine Feet by Buildings and other Obſtructions, and equally productive of the laſt-mentioned Hindrances, Dangers, and Delays.

After this Detail of Circumſtances, relative to this Bridge, the next Conſideration of Courſe muſt be the Manner of reſtoring it to public Utility; and in order to form a proper Judgment hereupon, many Trials to aſcertain the Nature and Quality of the Ground, cloſe to the Piers and Sterlings of the Bridge, have been made, by Borings into the Bed of the River; in moſt of which it was found clogged or filled up with looſe Stones and Gravel, to the Depth of twelve, fifteen, and ſeventeen Feet below the Bed; and afterwards a looſe Sand, with ſmall Gravel, for ten, twelve, or fifteen Feet more; and at a Medium between thirty and forty

Feet deep, from the Surface at low Water, before a ſolid Bottom was met with, which, on the South Side of the River, appeared to be a ſtiff Clay, and on the North Side a hard compact Gravel.

Under theſe Circumſtances the Difficulty of reſtoring the Part of this Bridge, which is fallen to its former State, *without the Uſe of Sterlings*, will be ſufficiently apparent to every Perſon converſant in thoſe Matters; and though it may not be an Impoſſibility, in Point of Art, to do it, ſuppoſing that Time and Expence were unlimited, yet it is one of thoſe Things that does not ſeem capable, even of an Eſtimate: And if Sterlings ſhould be admitted, and the former Method of Conſtruction allowed of, the Difficulty of eſtabliſhing them in a ſolid Manner, as well as the Foundations of two of the Piers which are totally overturned, in ſuch a Heap of Stones and Rubbiſh, not only fallen down at preſent, but which appear from the Borings, to fill up the Bed of the River to the Depth above-mentioned, would be ſo great, and the Execution ſo tedious, that it is difficult to form a Judgment what the Expence of ſuch a Conſtruction would amount to; and after all, the Bridge would be eſtabliſhed with every Inconveni-

ence

ence that now attends it, and which have already been enumerated; and at laſt remain equally expoſed to the Danger of being overturned by the next great Flood, as well from the Defects, in the Manner of eſtabliſhing the Foundation, as the contracting of the Water Way, and the Want of a proper Elevation of the Arches.

In order to aſcertain the Nature of the Ground under the Bed of the River, two Sets of Borings have been made acroſs it, the one about fifty and the other an hundred Yards above the preſent Bridge; the the latter from the Place called *Javel Groop*, to the oppoſite ſhore; from both of which a Maſs or Body of looſe Sand, mixed with ſmall Gravel, from twelve to thirty Feet in Thickneſs or Depth from the Bed of the River, appears to cover a ſtiff Clay, inclining from the South Shore, to near the Middle of the River; and a Maſs of the ſame Sand, from thirty to forty Feet in Depth, covers a hard compact Gravel, from the Middle to the North Shore, conformable to the Borings made at the Bridge itſelf, which have already been mentioned.

As the laſt mentioned Place or near it ſeems to be the moſt convenient Spot for erecting a new Bridge, whereby the Inconvenienveniences attending the old one might be removed, and at the ſame Time preſerve the beſt practicable Communication, from the Town to the oppoſite Shore, it neceſſarily remains to procure by Art, the Means of eſtabliſhing a ſolid Foundation, upon this great Maſs of Sand and Gravel: But as a Detail of this Part would run to too great a length, it may at preſent ſuffice juſt to mention the Out-lines of this Propoſition, which is, to ſpan the River with ſeven Arches only, whoſe Piers or Solids may not take up more than one-fifth Part of the Water Way; to lay the Foundations of the Piers and Abutments ſeveral Feet below the Bed of the River, upon a ſufficient Number of ſtout Piles, driven down under them, and to circumſcribe each with a Border of Plank Piling, driven cloſe to the Foundations; and thus at once to remove the Danger and Inconvenience to the Navigation ariſing from the Sterlings, and at the ſame Time admit of Four-fifths of the Breadth of the River to be free Water Way:—To give this new Bridge more Elevation than the old Bridge; to conſtruct the Piers and Arches with large Blocks of the hardeſt and moſt durable Stones the Country affords; to make the Breadth of the Bridge within the Parapets thirty

thirty Feet wide at leaſt, with a paved Way for Foot Paſſengers on each Side, and to ſuffer no Erections or Buildings whatever to occupy any Part of that Space ; to keep its Landing on the South Shore as much elevated as poſſible, and to bring the Road to join it forty Feet wide at leaſt, from the Top of the ſteep Part of the Battle Bank, near the Half Moon Lane, in a winding Courſe round the Hill, and by this Means to reduce the Deſcent or Aſcent to about one Foot in nineteen or twenty, or thereabouts, which will not be very perceptible. To open the Communication from the North End of this Bridge to the Cloſe; and, after allowing a ſufficient Area or void Space at each End of the Bridge, its Communication both Ways will be rendered as convenient to Paſſengers and Carriages as it is capable of being made.

In order to communicate the Road thro' Pipewell-gate, a dry Arch can be made in the Abutment; and to enable the Inhabitants of that Place, and the lower Parts of Gateſhead, to go over the Bridge in the readieſt Way, a Flight of Stairs can be erected from Pipewell-gate to the Top of the Bridge, on one or on each Side of the South Abutment, if thought neceſſary.

It is no Doubt an Objection to the New

placing of the Bridge, that it will be detrimental to thoſe who have Houſes in the Thorough-fare down the *Battle Bank* ; but when Buildings happen to be erected in a Place, and in ſuch a manner, as to be totally inconſiſtent with public Convenience, thoſe partial Inconveniences muſt either give Way to the greater Convenience of the Public, or the Public muſt ſubmit to the having them entailed upon it to Perpetuity: But to ſhew this in a clearer Light, let us ſuppoſe a new Bridge, built in the old Situation, whoſe Superſtructure is raiſed at the South End as much as the Poſition of the preſent Piers (which at all Events it ſeems neceſſary to conform to) will admit of; then if a gradual Slope is continued from the Brow of the Battle Bank (where it begins to be ſteep, that is, about ſeventy Yards North of Half Moon Lane) to the Bridge, it will form a Slope of about one in twelve and an half, which is not to be called an eaſy one ; and in this Caſe the Surface of the Road will be, in ſome Places, near the Bottom of the Battle Bank, twenty-ſix Feet above the preſent Pavement, ſo that the greateſt Part of all the Houſing down the Battle Bank, muſt be rebuilt ; nor can the Road thro' Pipewellgate be communicated with the Bridge, for

Horſes or Carriages, without forming a Slope almoſt an hundred Yards into Pipewell-gate, which will in like Manner induce the Neceſſity of rebuilding there; and the ſame of Hill-gate.

The Slope may indeed be eaſed by begining at Half Moon Lane, and cutting down the Breaſt of the Bank; but this will not bring the Slope under fourteen one-fourth to one: The Height of the Road, above the preſent Pavement, will be nearly the ſame towards the Bottom of the Bank; and the Set of Houſing, where the Ground will be cut, being undermined, or left conſiderably above the Pavement, will alſo need rebuilding to render them convenient; and after all, the Narrowneſs of the Street will be a permanent Inconvenience, which cannot effectually be remedied without totally rebuilding the whole Street.

It ſeems therefore, that there is no other Choice in this Matter, but either to rebuild the Bridge upon its former Principles, or to chuſe a new Situation. It is not to be doubted but that the Bridge may be reſtored to what it was, by proceeding upon the old Plan, at leſs Expence and in leſs Time than the building a new One; but the Inconveniences of Paſſage over and under before-

men-

mentioned, remaining with the Public to *Perpetuity*, can ſcarcely be counter-balanced by the ſaving of any moderate Sum of Money; nor can the Public be well accommodated with a temporary Bridge, without being at a much greater Charge.

It is not poſſible to judge compleatly of the Expence of building a new Bridge, till a juſt Plan thereof is formed, and from thence an Eſtimate made by a regular Induction of Particulars; but as this alone is in Reality a Work of Time, to enable the Gentlemen concerned to form their Judgment of preliminary Matters, we judge from the Execution of ſimilar Works, that a Bridge may be built at or near the *Javel Groop* to the oppoſite Shore, including the extra Expence on Account of the whole Bed of the River being a Maſs of Sand, for the Sum of fifty thouſand Pounds from Shore to Shore; that is, excluſive of Land Works and Purchaſes. A Bridge of this Kind will probably take ſeven Years to execute; and we are of Opinion, that to build a new Bridge in the old Situation, and on the ſame Principles as before, cannot be executed for leſs than Half the Money, and take Half the Time.

From this Propoſition, the Neceſſity of

purchaſing a conſiderable Quantity of Buildings, and other private Property, for the Uſe of the Public, will be very apparent, in order to make the Acceſs to the Bridge convenient on both Sides of the River: And if all this was not wanted for the abovementioned Purpoſes, a great deal would be abſolutely neceſſary to be had, for eſtabliſhing Yards and Sheds for Workmen, for performing the many different Operations the Edifice itſelf would require.

As the Time neceſſary for compleating this Work will be ſo conſiderable, a better Communication than the Ferries, already eſtabliſhed, may probably be judged unavoidable, during ſo long a Space of Time. In this Caſe, a temporary Bridge of Timber Materials, erected upon the Stumps of the old Piers, ſo as to join the four remaining Arches, with the Abutment remaining on the South or Gateſhead Shore, will be attended with the leaſt Expence and Inconvenience of any other Method, its whole Length being only three hundred and twenty Feet, which is about two-third Parts of the Breadth of the River. For effecting this, a proper Deſign, with a Conſtruction or Detail of every Particular, is now given in, and the Expence computed at about two thouſand four hundred Pounds.

Before this Work can be performed, the ſingle Arch remaining towards the Middle of the River muſt be taken down, and a little Time will ſhew whether this may be attempted with Safety to the Workmen, when it can be well aſcertained that the Opening or Rent therein has not encreaſed any more for any conſiderable Space of Time. It is further recommended to take up the Remains or Ruins of the three Arches and Piers next the Gateſhead Shore, leaving the Platforms or Remains of the Piers for eſtabliſhing the Legs of the temporary Bridge upon. The performing this as ſpeedily as poſſible will procure more free Water Way to the River, and of Courſe ſome Advantage as to the Safety of the four remaining Arches of the Bridge, in Caſe of another Flood, by allowing the Stream to paſs more freely on the oppoſite Shore.

When the new Bridge with its Communications are compleated, the temporary Bridge, with the Remains of the old Bridge, may be taken away, and the River freed from its Incumbrance to the Navigation.

Auſthorpe, J. SMEATON,
4th Jan. 1772. JOHN WOOLER.

To Sir Walter Blackett, Bart. Mayor,
the Aldermen and Common Council,
of Newcaſtle upon Tyne.

BRITISH MUSEUM 30 APR 70